



CIP
Composites™
Columbia Industrial Products

Hydraulic/Pneumatic Wear Rings



CIP Composites

CIP Composites are laminated polymer materials made by impregnating textiles with thermosetting resins. Solid lubricants are added to the resin to provide evenly dispersed lubrication throughout the material, providing smooth operation.

CIP custom wear rings are a superior alternative to commonly used cotton phenolic and glass filled nylon materials. They allow smooth operation and high side loads while protecting the sealing elements and preventing metal to metal contact in hydraulic cylinders. CIP wear rings are preferred where high performance, large diameters and/or high temperatures are required.

CIP Composite wear rings provide manufacturers and servicers alike with solutions to reduce overall maintenance and increase wear life. CIP offers short lead times, reducing the costs associated with equipment downtime and repairs. CIP Composites are manufactured in the United States using only the highest quality materials.

Benefits to using CIP Composite Wear Rings

- Self-lubricating
- Low coefficient of friction
- Protects the sealing elements and prevents metal to metal contact
- Excellent stability in water, corrosive fluids and chemical solutions
- Stable in elevated temperatures
- Capable of high loads
- Extended operating life
- Light weight
- Manufactured to specification
- Standard sizes 0.75 in - 65.0 in
Larger OD sizes available upon request
- Environmentally friendly
- Made in the USA



The surface finish of the mating component has a major effect on the performance of the wear ring and should be 4-32 (0.1-0.8 μm) Ra. Suitable materials are hardened or stainless steels.

CIP111 / CIP111A*



Polyester Textile
Graphite Lubricant
Polyester Resin

Traditional
Material

-40° to 200° F
-40° to 93° C

CIP131 / CIP131A*



Polyester Textile
PTFE Lubrication
Polyester Resin

Nonconductive
Material

-40° to 200° F
-40° to 93° C

CIP333 / CIP333A*



Meta-Aramid Textile
PTFE Lubrication
Vinyl Ester Resin

High Temperature
Material

-40° to 400° F
-40° to 204° C

* **Enhancement A** is a proprietary additive that increases the overall strength and reduces friction and wear.

Custom Wear Rings

Columbia Industrial Products offers a fully equipped machine shop on location ready to meet your needs. Wear rings can be manufactured to customers' specifications or our engineering department can provide recommendations. Designs are based on outside diameter (OD), thickness (T), and length (L) using inch units (metric units will be converted).

CIP wear rings are designed with a specific gap allowing the material to expand without seizing in the cylinder. The recommended gap takes into account the rate of thermal expansion and is best determined according to the OD of the wear ring. CIP recommends an angled cut to allow for continuous bearing support regardless of wear ring orientation.

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Material Properties

Based on CIP131 series sheet material.

Compressive Strength (ASTM D695)		
Ultimate	50,000 PSI	345 MPa
Yield	15,000 PSI	103 MPa
Parallel	13,500 PSI	93 MPa
Modulus	500,000 PSI	3,447 MPa
Tensile Strength (ASTM D638)		
	11,000 PSI	75 MPa
Tensile Modulus of Elasticity (ASTM D638)		
	470,000 PSI	3,240 MPa
Poisson's Ratio (ASTM D3039-08)		
		0.231
Shear Strength (ASTM D2344)		
	12,000 PSI	82 MPa
Flexural Modulus of Elasticity (ASTM D790)		
	260,000 PSI	1,793 MPa
Hardness Rockwell M (ASTM D785)		
		100
Density (ASTM D792)		
	0.047 lbs/in ³	1.3 g/cm ³
Water Swell (ASTM D570)		
		<0.15%
Coefficient of Friction - Dry Dynamic		
		0.15-0.20
Dielectric Strength (ASTM D149-97a)		
		240 volts/mil
Volume Resistivity (ASTM D257-07)		
		1.1 x 10 ¹⁵ ohm-cm
Operating Temperatures		
	-40° to 200° F	-40° to 93° C
Coefficient of Thermal Expansion		
	68° to 200° F	20° to 93° C
Normal to Laminate	3.5x10 ⁻⁵ /Δ° F	6.3x10 ⁻⁵ /Δ° C
Parallel to Laminate	1.8x10 ⁻⁵ /Δ° F	3.24x10 ⁻⁵ /Δ° C

Chemical Resistance

	68° F 20° C	120° F 49° C		68° F 20° C	120° F 49° C
Acetic Acid 15/100%	S/U	L/U	Fatty Acids	S	S
Acetone 15/100%	S/U	L/U	Hydrochloric Acid	S	S
Alcohol Ethyl 15/100%	S/S	S/S	Hydrofluoric Acid	U	U
Aluminum Sulfate	S	S	Maleic Acid	S	S
Ammonia Liquid	U	U	Naphtha	S	S
Ammonia Aqueous	U	U	Nitric Acid 15/100%	S/U	S/U
Ammonium Carbonate	S	L	Oxalic Acid	S	S
Ammonium Nitrate	S	S	Phosphoric Acid	S	S
Benzene	S	L	Phthalic Anhydride	S	S
Bleach Liquors	S	L	Potassium Hydroxide	U	U
Calcium Chloride	S	S	Sodium Carbonate 25/100%	S/L	S/U
Calcium Hydroxide	U	U	Sodium Chloride	S	S
Carbon Tetrachloride	S	S	Sodium Hydroxide	U	U
Chlorine Water	S	L	Sodium Nitrate	S	S
Creosote	S	S	Sodium Nitrite	S	S
Citric Acid	S	S	Sulfuric Acid 50/100%	S/U	S/U
Ethylene Glycol	S	S	Trichloroethylene	U	U

S = Satisfactory

L = Satisfactory for limited service

U = Unsatisfactory

Satisfactory is material retaining 50% or more of its original dry strength after six months immersed.